JPRS 77606

17 March 1981

Worldwide Report

TELECOMMUNICATIONS POLICY, RESEARCH AND DEVELOPMENT

No. 153

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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U.S. FACES STIFF COMPETITION IN LOCAL COMPUTER MARKET

Canberra THE FINANCIAL AUSTRALIAN in English 22 Jan 81 p 10

[Article by Douglas Moore]

[Text]

US manufacturers continue to dominate the Australian computer market but will face increasing competition from British and Japanese companies and, at the lower end of the market, from Australian computer manufacturers too.

According to figures released by IDC Research Australia earlier last year, the US giant IBM had 37 per cent of the Australian mainframe computer market in 1979, in terms of the installed computer base by CPU (central processing unit) value in US dollars.

US competitors Burroughs and Honeywell each had about 11 per cent of the market.

British manufacturer ICL had nearly 9 per cent of the market, and so did US company Univac.

Three more US companies followed: Control Data with just over 7 per cent; and NCR and DEC, each with nearly 4 per cent.

Facom, which markets computers from Fujitsu of Japan, had 3½ per cent.

IDC said that, altogether, more than 6000 mainframes had been installed in Australia.

However, in 1980 ICL Australia enjoyed a particularly good year and claimed to have increased its market share.

Facom won many competitive orders and no doubt increased its market share too.

IBM Australia claimed that 1980 was the best year in its history, so the inroads made by the British and Japanese were probably at the expense of some of the other US companies.

Nonetheless, the US companies still have more than 80 per cent of the Australian mainframe market.

They also dominate the Australian market for mini-computers and small business computers where, besides some of the mainframers, leading names include DEC, Hewlett-Packard, Wang, Data General, Perkin-Elmer and Basic Four.

In the market for portable micro-computers, US names are also predominant and include Tandy, Apple and Commodore.

Despite the strength of the US manufacturers, several Australian companies like Hartley, CMAD, D. D. Webster and Electronics Research Australia are now producing useful looking systems at the lower end of the computer market (Australia has no indigenous mainframe makers).

In the Australian computer manufacturing industry, the most exciting move of 1980 was Hartley's October launch of its innovative 3900 series of small business computers.

In 1981, following IBM's recent release of its 3081 mainframe, much interest will focus on the top end of the computer market.

Commenting on the continuing improvement in performance, computer industry observer Joe McLean, writing in the US newspaper Electronic News, says the IBM 370/168 came in eight years ago at about $1.5 million per Mips (Millions of instructions per second) whereas the new 3081 is rated at about $380,000 per Mips.

So far only California-based Amdahl has responded to the 3081.

According to Mr McLean, Amdahl's new 5860 system is believed to offer performance slightly under 13 Mips for a price about 6 per cent below IBM's 10.2 Mips 3081.

IBM has also cut prices for its existing 303X line and introduced a new model in this line, the 3033S.

Mr McLean reports that the traditional mainframe manufacturers are not saying much about competing against the 3081.

CSO: 5500

RESEARCH AGENCY PLANS SATELLITE GROUND STATIONS

Dacca THE BANGLADESH OBSERVER in English 25 Jan 81 p 12

[Text] Bangladesh Space Research and Remote Sensing Organisation (SPARRSO) will establish multipurpose satellite ground stations for visual analysis and machine processing of satellite and airborne data on natural resources and environmental hazards a seminar was informed in Dacca on Friday reports ENA.

Organised by the Sparrso the seminar on "applications of space technology and remote sensing in resource survey and environmental monitoring" was inaugurated by State Minister for Science and Technology Dr. R. A. Ghani at the Atomic Energy Centre Dacca.

Dr. R. A. Ghani suggested that the facilities of the global remote sensing programme be used in regional training and applied in disaster preparedness. The countries of the region can immensely benefit from each other in remote sensing activities he added.

Dr. Ghani said that the satellites are important tools in detecting and giving advance warning of the natural disasters like tropical cyclones, tornadoes, nor'-westers, floods and drought. He said that information collected by satellites and aircraft can serve as a data bank which will contribute towards development planning.

The State Minister said that the government has attached top priority to the development of science and technology, particularly on space application and remote sensing. The government has already formulated a science and technology policy to create local technolgoical base for fostering economic development, he pointed out.

CSO: 5500

PLANS FOR USE OF SPACE TECHNOLOGY TOLD

Dacca THE BANGLADESH TIMES in English 26 Jan 81 p 3

[Text] The Government has taken steps for extensive research on space technology and remote sensing for exploring and harnessing the untapped natural resources of the country.

This was stated by the State Minister for Science and Technology, Dr R. A. Ghani, while inaugurating a seminar on applications of space technology and remote sensing in resource survey and environment motitoring at the Atomic Energy Centre on Saturday, according to an official announcement. [as published]

He said that our country has vast natural resources on the land and in the sea. Remote sensing is the most effective means of exploring these resources, he added.

Organised by the Bangladesh Space Research and Remote Sensing Organisation, the seminar was presided over by Dr Anwar Hossain, Director-General, SPARSO. Papers were read out by Mr Z. D. Kalensky, FAO; Mr P. Chechan and Mr I. Walter of France and Mr M. U. Chowdhury, Mr M. A. H. Pramanik and Dr A. M. Chowdhury of SPARSO.

In his presidential address Dr Hossain stated that the real time data received from satellite via ground station would be of immense value in detection of agriculture and water resources. He said that the international agencies like UNDP, FAO, World Bank, IDRC and some friendly countries particularly the USA and France had provided support in the form of equipment, materials, expert services, training etc in the building up of the infranstructure and core manpower of SPARSO. [as published]

The day-long seminar was attended by the scientists from home and abroad.

CSO: 5500

INFORMATION MINISTER AT TV CENTER DEDICATION

Calcutta THE STATESMAN in English 7 Feb 81 p 14

[Text]

BANGALORE, Feb. 6.—Bangalore may have colour television. Mr Vasant Sathe, Union Minister for Information and Broadcasting, hinted at this while laying the foundation of the doordarshan kendra here on Wednesday.

The Defence Ministry at the instance of Mrs Gandhi, who is also the Defence Minister, has given three hectares belonging to the Central Inspectorate of Electronics in the city for the construction of the centre. The civil works, including the 180-metre high TV tower, may cost Rs 1.6 crores and equipment Rs 1.8 crores. Most of the equipment will be supplied by the State-owned Bharat Electronics. The centre expected to be commissioned in three years, will cover six million people of the State within a radius of 100 km.

Mr Sathe said the Defence Ministry had given an excellent gesture in making its land available for the centre. Though the Information and Broadcasting Ministry would pay the money, the task of construction would be handed over to the State Government.

"You can make it as beautiful as you want", he told Mr R. Gundu Rao, Chief Minister, who presided over the function. The TV studio and centre, the Minister pointed out, must have the latest equipment. "There can be no compromise on that. Don't go in for junk. In technology no one can lag behind", he said. Mr Sathe criticized the scientists who opposed colour TV and were causing confusion. "Scientists want to go in space. But when it comes to TV which is the most effective mass communication and audio-visual means of education, the scientists who know nothing of TV insist on rejected and obsolete technology. I am amazed at this".

If the opposition by the scientists could be removed, Mr Sathe said, they could "persuade Mrs Gandhi to go in for colour TV for the Bangalore centre. Colour TV, he explained, did not mean that viewers could not have black and white receiving sets. "The black and white sets will receive colour telecasts sharply as black and white. But if you have colour sets and there is no colour transmission you will not be able to receive it". The cost of colour transmission was only 20% more than that for black and white. "Today one has to search in the world for black and white equipment because no one is producing it now and probably one could get only the rejected ones" Mr Sathe said the TV centre and the tower should be unique piece of architecture not only in the whole of India but in South-east Asia. He wanted the TV tower to have a viewing gallery and a restaurant at the top.

The Chief Minister said it was normally difficult to get land from the defence or the police. But the credit should go to Mrs Gandhi for sanctioning defence land for the centre. He assured Mr Sathe that the State Government would start construction without delay.

CSO: 5500

BRIEFS

MARITIME SATELLITE STATION--A coast-earth station will be set up near Bombay within three years to facilitate maritime satellite communications. This was stated by the director-general of the Overseas Communications Service, Mr. M. S. Nagarajan, while speaking at a seminar of "International maritime satellite communications" here today. Once the system is pressed into service, ships will be equipped with what is known as an earth station. They will then be in a position to communicate with coastal stations through a satellite. According to Mr. Nagarajan till December 1, 1980, about 500 ships all over the world have been fitted with this facility. These include cargo containers, drilling ships and platforms, government vessels and passenger ships. [Excerpt] [Bombay THE TIMES OF INDIA in English 8 Feb 81 p 5]

SATELLITE LAUNCHING PLANS--Bangalore, Feb. 7.--India's fourth satellite--Satellite for Earth Observations II--for conducting earth resources survey would be launched during July-September this year, according to the Indian Space Research Organization, reports PTI. The SEO II said to be an improvement on Aryabhata and Bhaskara. It would analyse and disseminate data of relevance to hydrology, forestry and geology. It will also study ocean surface and conduct studies in meteorology. The spacecraft will have a narrower band-width in the television system for increased frequency of observation and improved data capabilities. [Text] Calcutta THE SUNDAY STATESMAN in English 8 Feb 81 p 10]

SURATGARH STATION GOES ON AIR--In Rajasthan, the Suratgarh station of All India Radio will go on the air from tomorrow [22 Feb]. This will be the 6th station in the state and the 86th station in the country. The program format of the station has been devised in keeping with the needs of the population of the area. [Text] [BK211616 Delhi Domestic Service in English 1530 GMT 21 Feb 81]

CSO: 5500

'RENMIN RIBAO' INTERVIEWS OFFICIAL ON RADIO, TV INDUSTRY

OW050720 Beijing XINHUA in English 0705 GMT 5 Mar 81

[Text] Beijing, 5 Mar (XINHUA)--China's production of radios and televisions has made rapid progress over the past 2 years, said a leading official of the National Bureau of Broadcasting and Television Industry in an interview carried in today's "PEOPLE'S DAILY."

But the official also noted that large quantities of imported TV sets and complete sets of components have impeded the growth of China's TV industry.

The official said China produced 26.2 million radio sets last year, a 94.5 percent increase over 1979, 2.22 million TV sets, an increase of 69.3 percent, 503,000 tape recorders, an increase of 226 percent, and 845,000 gramophones, an increase of 68.2 percent.

According to preliminary figures, he said, the state withdrew 2,100 million yuan from circulation in 1980 from the four items, 80 percent more than the year before. Also, the state gained 33 percent more profits than in 1979 because of decreases in production costs.

The official noted that the quality of TV sets has improved markedly. The life-span of China-made tubes now exceeds 5,000 hours.

Last year, he said, China's radio and television industry stepped up specialized production. Ten integrated or specialized companies were set up in radio and television industrial centers, thus expanding production capacity.

A number of advanced production lines were built in the cities of Shanghai, Beijing and Tianjin and in Jiangsu, Liaoning and Guangdong provinces. Some of the TV lines have an annual capacity of 50,000 to 80,000 TV sets, some of those for radio 150,000 to 300,000 radio sets, and some producing cassette tape recorders 80,000 to 300,000 machines.

CSO: 5500

BRIEFS

INTERNATIONAL TELEX--Cable and Wireless has this week introduced another telecommunications service to Bermuda. By a relatively simple adjustment to the company's central computer, the Island's almost 500 telex subscribers are now able to make local as well as international telex calls. A spokesman for Cable and Wireless described the new facility as complementary to the existing telephone service. Local businesses now have the ability to confirm telephone conversations by means of a printed telex message. Such a local telex service has been available for some time in countries such as the United Kingdom, Bahrain and Hong Kong. The new service costs 12 cents per minute. [Text] [Hamilton THE ROYAL GAZETTE in English 29 Jan 81 p 13]

CSO: 5500

DIGIBRAS STRATEGY TO EXPAND SALES IN LATIN AMERICA DISCUSSED

Rio de Janeiro GAZETA MERCANTIL in Portuguese 29 Jan 81 p 8

[Article by Brasilia correspondent Rogerio Troyano]

[Text] The Brazilian Digital Corporation (DIGIBRAS) is developing a strategy for penetrating the Latin American market the principal aim of which is to sell Brazilian products in the near future. Initially, DIGIBRAS experts visited Caracas, Venezuela, where they made a preliminary survey of the local conditions, the computer industry complex, technical assistance services and the Venezuelan computer market.

According to DIGIBRAS expert Descartes Teixeira, the conclusion was that Brazil can immediately supply the Venezuelans with programming services and suggestions for the establishment of the data-processing industry in that country. A report is presently being prepared on the situation in Venezuela in which the Venezuelan authorities are advised to train manpower for that sector. Brazil is prepared to provide post-graduate courses in data-processing in the universities of Sao Paulo and Campinas and the Federal University of Rio de Janeiro. It is going to suggest also that Venezuela adopt simpler computer systems, such as the Cobra 400, which Brazil can supply together with the software programs already set up, to prepare payrolls and collect water, light and sewer bills among others.

Research

At the same time, the DIGIBRAS experts suggest that the Venezuelan authorities conduct a more detailed survey of the number and types of computers in that country and the present level of use of data-processing in Venezuelan private and public companies. Similar contacts are also being made with other Latin American countries such as Mexico, Peru and Costa Rica. The talks are still of a preliminary nature but Descartes Teixeira believes that they can become fruitful within a short time.

These are the basic outlines of DIGIBRAS' foreign sales strategy. On the domestic front, it is now beginning to set up its headquarters in Brasilia to implement the basic characteristic of the company defined by the Figueiredo government: to be a company for fostering data-processing activities, avoiding as much as possible nationalization of that sector. The only state company left in the area is the Brazilian Computer Corporation S. A. (COBRA).

Services

An example of how to foster activities in that sector is the survey that DIGIBRAS plans to conduct in 500 Brazilian municipalities to see if they are in a financial position to electronically process services, such as managing public works, collecting water, sewer and light bills, in addition to managing the collection of the Tax on Services (ISS). The results of those surveys will be passed on to the companies that build mini and micro-computers, opening up a new business field for them.

8711
CSO: 5500

INTERNATIONAL BIDDING FOR SATELLITE PURCHASE TO OPEN IN 1981

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 23 Jan 81 p 9

[Text] Communications Minister Haroldo Correia de Mattos asserted in Rio yesterday that the call for international bids for the purchase of a domestic satellite for Brazil will be made this year, although he pointed out that the matter is still being studied by the Brazilian Space Activities Commission and that a final decision is up to the president of the republic.

The minister emphasized that to purchase the new satellite, the Brazilian Government is going to invest $80 million (approximately 5.6 billion cruzeiros) in a period of 7 years, lacking three, which is included in the budget obtained for the sector. "The fact is that we received 115 billion cruzeiros when we had requested 138 billion. Hence we approached that figure very closely, because our figures are computed very carefully. That represented an increase of 40 percent." [as published]

Despite the fact that the domestic satellite still has to be purchased abroad, the minister announced that the whole space segment for the project will use national technology and for that purpose the number of ground tracking stations is being expanded, with all equipment built by AVIBRAS [Brazilian Aviation], under the guidance of the Campinas Research Center.

Telephones

Another experiment that, in the minister's opinion, has worked out well, is the party line, by which two subscribers can use the same external telephone network, thereby, proving profitable to the subscriber, who can get the telephone for half the price, as well as to the telephone company, which will invest less in equipment installation. "That idea came up after a survey we conducted which proved that 30 percent of the subscribers do not use the minimum charges -- 90 free calls per month. Thus, for many, the telephone is not used much despite the expense of equipment maintenance."

According to him the party line started in Rio by the Rio State Telephone Company (CETEL) in the low-family-income districts will also be tested in the satellite cities of Brasilia within the next few onths, and only next year will it extend to the other states: "At the present time, we still do not know when that experiment may be applied in other Brazilian capitals but we hope to be able to do that as soon as possible."

While recognizing the advantages of the new system, the minister admitted that, although one subscriber to a party line has a different telephone number from the other, he will be able to use it for receiving as well as for making calls only if the other party subscriber is not using it. "But that is the price the subscriber will have to pay to be able to get his telephone 50 percent cheaper."

Television Channels

Minister Haroldo Correia de Mattos reiterated that the concession of the two new television channels will be decided by the president of the republic "since the final report was already submitted to him last 8 December. Besides that, I do not know if the president has some time period for granting the new concessions."

The minister admitted that the decision will have a political base, "inasmuch as a president never takes a decision without looking at the political side." He said it was his opinion that all that time the government is studying the matter--about 3 months--may result in losses for the future concessionaires, mainly because of worker liabilities: "But those are the risks the competitors are running and that, after all, they knew from the start."

Reiterating that the announcement of the winners will be made by President Joao Figueiredo, Haroldo Correia considered it natural that the National Intelligence Service (SNI) should be consulted on that decision--it had even prepared a report on the subject--inasmuch as its "chief is a minister of state and, therefore, competent to give his opinion." However, in the selection, criteria are always used that are even subjective, and the news reports of some of the newspaper companies that are seeking the concession may influence the government's decision."

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CSO: 5500

DENTEL TO MONITOR COMMUNICATIONS MEDIA MORE CLOSELY

Rio de Janeiro O GLOBO in Portuguese 29 Jan 81 p 8

[Text] Brasilia--The president of the National Telecommunications Department (DENTAL), Antonio Fernandes Neiva, revealed yesterday that there will now be closer monitoring of the communications media, since an intensive campaign has been carried out during the past 2 years to explain the legislation.

Antonio Neiva said that the fine applicable to radio stations that exceed the time devoted to commercials and the presentation of foreign music and carry a minimum of news programs is 90,000 cruzeiros but it can range up to 400,000 cruzeiros or even suspension of the company in the case of repetition.

According to the statistics prepared by DENTEL, the AM (medium wave) stations violate the law most of the time by an excess of commercials, and the FM stations by exceeding the time for the presentation of foreign music.

Another concern of DENTEL's pertains to the interference caused by other communications services that prevent the viewer from watching television programs. According to Antonio Neiva, that problem is caused by the excessive operation of radio amateurs but in 85 percent of the cases it is caused by the receiving set itself because television set manufacturers, for economy reasons, do not install filters that would eliminate interfering signals.

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CSO: 5500

BROAD TELCO IMPROVEMENT PLANS OUTLINED FOR 1981-82

Port-of-Spain TRINIDAD GUARDIAN in English 27 Jan 81 p 1

> [Excerpts] The Development Programme of the Trinidad and Tobago Telephone Company (Telco) is expected to show tangible results with improved service to subscribers by March.

The Telco story was outlined at a Press conference yesterday chaired by Rep. Hugh Francis, Minister of Transport and Communication, at the Hilton Hotel, in Port of Spain, Mr Francis said that barring any unforeseen circumstances there ought to be a "a noticeable change, improvement-wise."

However, subscribers would eventually be called upon to pay more for an improved service.

Sitting in with Rep. Francis at the Press Conference were Mr Fenwick De Four, Chairman of Telco; Mr Selby Wilson General Manager; Mr Edward Beckles, Chief Engineer; and Mr Rowland Parris, Manager, Public Relations.

Mr Wilson explained that Telco had a waiting list of about 50,000 subscribers; present subscribers numbered about 45,000.

Later on in the conference he agreed that there was a potential demand for about 100,000 additional lines.

Telco's expansion programme calls for an overall exchange capacity, increasing from 53,630 lines to 90,270 lines this year and further increased to approximately 132,000 by December, 1982.

In efforts to provide more lines for the public there are also proposals for an independent switch to deal with Government and Telco's telephone requirements which would result in the release of about 2,000 lines for the public.

External Forces

Cost of the 1976-1980 programme was at first estimated at $100 million. However, with later changes in the programme and inclusion of the rural development, the cost doubled to $200 million.

Minister Francis explained that in addition to developments relating to the urban area, the company was currently evaluating tenders for the expansion of the rural telephone network in 1981-1982 period.

The rural area include San Souci, Fishing Pond, New Grant, Manzanilla, Moruga, Bonasse, Brasso, Biche, Balandra Coromandel, Moriah, Castara, Parlatuvier and L'Anise Fourmi.

Minister Francis also revealed that Telco had employed consultants from the International Telecommunications Union and Bell Canada of assist in company planning, operational systems, maintenance procedures and organisational restructuring. [as published]

Direct Dialling

Among improvements planned in Telco's development programme are expansion of Telex facilities, introduction of new subscriber services including international direct distance dialing, abbreviated dialling, call transfer and call waiting.

Earlier, Mr Wilson explained that part of the company's contract with the foreign firms allowed the employment of foreign labour but the terms included the development of nationals.

He said he had no doubt that the productivity of the contractor was higher than employees of Telco, explaining that the employees of the contractor had a ten-hour day, six-day week.

CSO: 5500

BRIEFS

KANO DROPS NATIONAL LINK--Radio Kano--The Kano State Government radio station no longer links up with Radio Nigeria, Lagos, for the national network news and other network programmes. Announcements made over the radio network indicated that other local programmes would be aired in place of the network programmes. There were six slots for national network news from Lagos. The announcements did not specifically say the programmes being dropped were network programmes but the timing was a clear indication of those affected. Efforts to get the station's authorities to comment on the change were fruitless as they were reportedly busy holding various meetings. Any listener to the station will, however, confirm the changes since locally produced programmes are aired when it is time for network programmes. As a result of the changes, listeners in Kano will have to tune other Radio Nigeria Stations to hear national news. Our correspondent observes that Radio Bendel has taken similar steps and the changes may therefore be a product of the 'nine governors' meetings'. [Text] [Kaduna NEW NIGERIAN in English 23 Feb 81 p 13]

MONEY FOR BOOSTER STATIONS--A contract worth 2,245,010 Naira, has been signed between the Kano State Government and Harris Broadcasting Corporation of the United States of America for the establishment of two booster stations for the state's broadcasting corporation. The contract agreement was signed on behalf of the state government by the acting Commissioner for Home Affairs and Information, Alhaji Mahmud Othman, the state Solicitor-General, Alhaji Danlami Mohammed and the General Manager, Kano State Broadcasting Corporation, Alhaji Bagudu Bida. Speaking shortly after the signing of the agreements, the general manager disclosed that two 10 kilowatt transmitters would be installed at the stations to be sited at Birning Kudu and Kazaure Local Government areas. He said technical staff of the corporation would soon be given a special training in the maintenance of the two transmitters. The installation work is expected to be completed within six months. [Text] [Kaduna NEW NIGERIAN in English 20 Feb 81 p 13]

CSO: 5500

BRIEFS

SATELLITE TELECOMMUNICATIONS SYSTEM--On 24 November 1980, the French company Thomson-CSF [General Radio Company] handed over to the Executive Council, in turn-key condition, 13 ground stations, 17 television transmitters, a number of radio links, miscellaneous equipment (since of television reportage...[as published]). This was announced to the press, on the occasion of the visit to Kinshasa by the French secretary of state for postal and telecommunications service, by Jacques Dupouy, Thomson-CSF's managing director for Zaire. The realization of this important telecommunications network, for which Thomson-CSF is the prime contractor, has gone on for 30 months. It is joined to the first connection (Kinshasa-Lubumbashi), placed in service on 24 November 1979. And this, he added, is to the great satisfaction of both countries. Jacques Dupouy said he is very pleased with the creation by our two states of the mixed company for long-distance telecommunications. The Thomson-CSF company has been in Zaire since 1970. Jacques Dupouy, its permanent representative, declared that thanks to President Mobutu, Zaire has provided itself with the biggest and highest-performance domestic system for telecommunications via satellite in operation. Currently, 150 telephone channels and 480 telex channels are being installed. [Excerpts] [Kinshasa ELIMA in French 26-27 Dec 80 pp 1, 7] 11,267

CSO: 5500

'CRITICAL' TELECOMMUNICATIONS TECHNOLOGIES EXAMINED

Paris L'ECHO DES RECHERCHES in French May 80 pp 77-82

[Article by Maurice Bernard, director of the CNET; passages enclosed in slantlines printed in boldface]

> [Text] The applied research being performed at the CNET [National Center for Telecommunications Research] is devoted to the goal of achieving strategic objectives defined by the General Directorate for Telecommunications. The processes leading to identification of "critical technologies," the main directions of future efforts, are based upon thorough analysis of two sets of paired concepts: services-functions and functions-technologies. Six large technological families can be thus cited.
>
> Although efforts in these areas are directly motivated by specific requirements for increased profitability or improvement of existing systems, the field of scientific possibilities from which progress will be derived appears wide open.

Research and Technology

The Two Kinds of Research

The continued technical progress which we are witnessing flows more or less directly from research, or more precisely, from the various forms of research: pure research, basic research, objective oriented research...the diversity of terms denotes the complexity of the activities the word encompasses.

/Basic research/is the more or less organized human activity which is aimed at increasing scientific knowledge. The fruit of the research is therefore scientific information which is new in character: this information is divulged in the form of an article in a scientific journal or a communication to a colloquium of specialists; at this level patents are uncommon. The character of novelty is essential: to discover a principle or propose a concept is of interest only if the principle or concept is new; one must be the first to observe a phenomenon, effect a measurement; in general being the second is scarcely of any interest.

From this there result two consequences:

--it is necessary to publish quickly and be well publicized;

--science and the basic research which causes it to progress are, in essence, both /universal/. The scientific community is an arena of constant international competition.

The National Center for Telecommunications Research, in the area of basic research, is concerned only with what is called /oriented basic research/, that is, by the growth of scientific knowledge in those domains and on those subjects capable of leading to applications of interest to telecommunications. Let us cite several subjects oriented toward telecommunications (and, incidentally, toward other economic sectors):

--materials sciences,
--terrestrial environment,
--signal and information theory,
--data processing and logic science,
--systems theory: operations research, modeling, etc.

Although the overall extent of the expected fallout can be estimated, each subject, each bit of progress, cannot be assigned to a designated technical end. A large organization having a defined economic function should therefore be able to adopt tactics consistent with utilization of the progress in scientific knowledge without needing to advance it by its own teams. In fact it is generally accepted that such tactics have the contrary effect of resulting in a notable lag behind competitors. Some effort in oriented basic research is therefore indispensable if one desires to remain competitive in the applied research activities downstream: in a way it is paying dues for membership in the international knowledge club.

Progress in scientific knowledge by itself is not enough to elaborate a new technology, to produce technical progress: there must be another form of research, called /applied research/, or sometimes, /exploratory research/. The objective of that activity is to determine /feasibility/; for example, one will strive to:

--demonstrate the feasibility of a new component;
--draw up a new data-processing language;
--design the structure of a new system.

Applied research is clearly distinguished from oriented basic research. There, too, some prestige is attached to being the first, and the related publications are there to prove it; the publication, however, and above all the patent, which here assumes great importance, do "not tell all"; a part of know-how cannot be transmitted. If one is not the first in an area considered of high priority, the original work must be repeated, the feasibility in question must be established for oneself, and this /know-how/, which only /doing it/ can provide, must be acquired.

Applied research is also distinguished from oriented basic research in the criteria and evaluation procedures. As for the latter, the very existence of an international scientific community in free competition makes it possible to form an approximate judgment of the caliber of a research worker, a team, or a laboratory; several good scientists having a view with adequate perspective of the teams in competition are sufficient to make an effective evaluation.

In applied research the judgment of a certain community is not without usefulness, but this becomes secondary to consideration of the adequacy of the subjects developed for the strategic objectives of the one who is financing the research in question; economic considerations especially weigh very heavily.

Why Critical Technologies?

The meaning of the word technology, very much in fashion for some time, must be defined precisely. /"The" technology/, with the definite article, is the Science of Techniques; but when one speaks of /a/ technology, it is rather the Anglo-Saxon meaning of the term which prevails.

/A technology is a combination of capability and know-how making it possible to construct an item of equipment (or a subassembly of such equipment) or a logic system. That equipment, logic system, or a combination of the two enables a product or service to be offered./

For example, in order to manufacture and sell integrated circuits, silicon microelectronic technology must be available, that is, must be mastered.

A technology is thus the result of an ensemble of applied researches and a series of technical and economic optimizations.

What is a /critical technology?/

A technology is critical for a firm, organization, or country when the fact that it has not been mastered can affect their vital interests. That is a contingent concept, which depends upon the circumstances and the desired objectives. This can be illustrated with some examples:

Example 1. A technical novelty, even minor, can improve an existing technology, thus giving birth to a new technology enabling manufacturing costs to be reduced: for the industry concerned such technology has become critical. Not to master it means loss of competitiveness.

Example 2. If within the scope of a telemation policy a function requires, with no available alternative, that we display upon a flat screen, the technology of technologies which will enable that requirement to be met are critical for the strategy corresponding to that policy.

Identifying the Critical Technologies

To identify the technologies which are most critical today with respect to the strategy of the General Directorate for Telecommunications, we shall attempt to trace /products and services/, which constitute an ensemble of objectives, to the /functions/ which must be available to manufacture those products and provide those services. Then we shall try to trace this function back to the /technologies/ which can be contemplated for fulfilling them.

Products and Services

One might try to imagine what telecommunications of the year 2000 will offer to users: that exercise in prediction, however interesting and necessary it may be, is too uncertain to indicate anything other than scenarios or trends. One can also start from services which exist or for which the feasibility is imminent; this much easier exercise is sufficient to identify the most important technologies of the next 10 years.

We shall adopt the following list:

1. The intelligent telephone: it corresponds to a range of varied equipment including various options: free hands, display, memory, alarm, protection, etc. It is the simplest telemation terminal. The terminal aspect is obvious, but what are important are the services provided.

2. Telex, teletex, electronic mail: services of the exchange, which go as far as electronic funds transfer

3. Radiotelephone: communication with mobile units, paging people.

4. Telecopier.

5. Videotex.

6. Live images: visioconference, videotransmission, visual telephony.

7. Telecommunications systems: the combination of various services enabling an entire range of systems from the PABX (private automatic board exchange--a private switchboard) to the most sophisticated communications system to be provided.

All these services will be provided to a market which can be divided into three distinct segments:

--The commercial market: manufacturing and commercial firms of some size with diversified installations which have substantial requirements for inside and outside communication;

--The professional market: the liberal professions, the self-employed, small merchants, etc;

--The residential market.

Their design must fulfill three major conditions:

1. Adaptation to needs: The newer the service offered the more difficult this is. A vicious circle must be broken: how can acceptance be studied without having developed the equipment and defined the service, and how can the equipment be developed without having identified a need, a market?

2. Exports: International standardization and adequacy in meeting needs of the worldwide market must necessarily be respected;

3. Costs: Installation, maintenance and administration of a service will, in toto, have to result in very low cost so as to satisfy as large a share as possible of the intended markets.

Any telemation service or product is based upon three general functions: the person-terminal relationship, data processing, and data transmission.

--The person-terminal relation and its converse represent, respectively, the "input" and "output" of the service supporting equipment system. It involves, for example, capturing the voice (microphone...), manipulation (keyboard...), fixed or live images, and conversely, reproducing voices, sounds, images, characters, etc.

--Data processing covers highly varied operations such as coding, decoding, filtering, multiplexing, storage in memory, cryptography, etc.

--Data transmission in general is accomplished by way of free or guided propagation of electromagnetic waves of various frequencies: radio range, microwaves, and optical frequencies.

Since any service or product has recourse to these three general functions at the same time, it is necessary to push the analysis further by considering the principal technical functions upon which these three functions are based.

The Technical Functions

Seven groups of technical functions can be identified.

I. Transducers: these functions provide passage of data from one support to another; for example:

A. Acoustic-electric transformation and vice-versa,
B. Electric-optical transformation and vice versa,
C. Readout: for example optical,
D. Printout: printing,
E. Display or visualization,
F. Antennas (they transform free electromagnetic energy into guided energy and vice versa).

II. Data Processing (coding, storage, etc)

A. Codec for word signals,
B. Image coding,
C. Addressed memories,
D. Filters,
E. Amplification, detection, regeneration.

III. Commutation (focusing, directing)

IV. Transmission (propagation, support)

V. Logic System (programming, automation)

VI. Connection

A. Electrical
B. Optical

VII. Energy

The Service-Technical Function Correlation

If we construct a matrix with SERVICES on the lines and technical FUNCTIONS heading the columns (see table below) and if each intersection where it seems desirable to achieve progress in performance and costs is marked with a cross, it will be seen that the majority of the intersections are so marked. To obtain a picture with more contrast we are going to adopt the following method:

--Eliminate the last service (telecommunications system) which provides no additional information since it is only a combination of the other six services identified;

--Introduce a "hidden service," namely the network, which will permit taking into account this service, internal within the telecommunications enterprise, which exploitation of the network itself represents. The result is that upon line 7, network, crosses appear in almost all columns, which signifies that general network progress depends upon progress achieved in all functions;

--Place a cross in an intersection only when essential problems appear. For example, the telecopier, as well as most of the other services, will benefit from progress in connectors; nevertheless case 4-VI is not marked with a cross, while case 4-I is, because the progress in document readout or printout on paper obviously plays an essential role in perfecting telecopiers.

Functions Services	Trans-ducers	Data processing	Commu-tation	Trans-mission	Logic System	Connec-tions	Energy
1. Intelligent telephone terminal	X	X					X
2. Telex, teletex, electronic mail	X	X			X		
3. Mobile units, radiotelephony, paging persons		X		X			
4. Telecopier	X	X					
5. Videotex	X	X					
6. Live images	X	X	X	X		X	
7. Network		X	X	X	X	X	X

Naturally, closer examination of a service of function leads to subdividing each line and column into finer sections. This is especially useful with the first two columns detailed in the table below. It will be seen that in this table several columns, that is several functions, appear especially heavy with crosses:

I-B (Electrical to optical, and vice versa),
I-E (Visualization and Display),
II-A (Codec),
II-C (Addressed memories).

In contrast, it is found that the last column II-E (Amplification), detection) has crosses only in the last line, that of Network, for it is from its development that progress in technical functions under this heading will benefit rather than from the success of this or that service.

Functions Services	I- Transducers	I-A Acoustic to electric and vice-versa	I-B Electrical-optical and vice versa	I-C Readout (optical)	I-D Printout (printer)	I-E Display and visualization	I-F Antennas	II Data processing	II-A Codec	II-B Image coding	II-C Addressed memories	II-D Filters	II-E Amplification, detection, regeneration
1. Intelligent telephone terminal	X	X	X			X		X	X		X	X	
2. Telex, teletex, electronic mail	X		X		X	X		X	X		X		
3. Mobile units radiotelephony, paging people							X	X			X	X	
4. Telecopier	X		X	X	X	X		X	X	X	X		
5. Videotex	X		X			X		X	X		X		
6. Live images	X		X	X		X		X		X	X	X	
7. Network							X	X	X	X	X	X	X

Know-How: The Technologies

The term technology, which was defined above as the ensemble of capability and know-how making possible the construction of equipment, a logic system, or a combustion of the two which accomplishes a given function, covers situations which differ greatly. For example, a /major technology/ such as silicon microelectronics, which in fact comprises a cluster of organized in many /processes/, can be distinguished from a limited technology such as that of magnetic bubbles.

It is also possible to distinguish between a nearly stabilized major technology, such as that of television tubes, and young technologies in full evolution. Those of the former are in general the basis of industrial fabrication; the others are sometimes still in the preindustrial phase; integrated circuits are a notable exception: they already constitute a large industry and nevertheless are undergoing constant evolution.

The extreme diversity of technologics in the field of telecommunications, as well as the unforeseen emergence of future technologies, make a systematic analysis difficult. In fact, the list below is neither complete nor based upon very rational classification criteria; it is comprised of six large groups of technologies.

A. Optical Technologies

A-1 Support: glass, silica, fibers, cabling, various others;

A-2 Emission: electroluminescent diodes, laser diodes, emission strips, emission panels, modulation;

A-3 Reception: photodiodes, phototransistors, photocouplers, strips, reception screens, cameras;

A-4 Commutation and focusing: time and space multiplexing, address directing, bistable optics, optical commutation, integrated optics;

A-5 Ultrarapid optics (picosecond);

A-6 Optical memories;

A-7 Connectors, connections.

B. Microelectronic technologies: These technologies today are mainly concerned with silicon; one day perhaps they will be based upon materials of the GaAs [gallium arsenide] type, especially in the case of optical-electronic integrated circuits. Let us mention:

B-1 Energy components;
B-2 Microwave components;
B-3 Memories;
B-4 Analog integrated circuits;
B-5 Digital integrated circuits;
B-6 Microprocessors;
B-7 Integrated optical-electronic circuits.

C. Assembly technologies

C-1 Ceramics;
C-2 Insulators;
C-3 Plastics;
C-4 Printed circuits;
C-5 Hybrid circuits.

D. Transfer technologies

D-1 Graphic reproduction;
D-2 Printing.

E. Logic technologies

F. Technologies related to human sciences

Correlation Between Technologies and Functions

The same method of establishing a matrix and examination of the intersections, more or less enlarged, is adopted. To make the analysis easier we shall first of all select those functions which seem most important, whether they prove indispensable to an important service or whether the present techniques are shown to be too expensive or too inconvenient.

Thus we shall select the functions designated I-B, I-C, I-D, I-E, II-A, II-B, II-C, and II-D in the preceding table, which are indispensable to the development of certain services.

I-B. Electrical-optical transformation and vice versa: light emission and photodetection are essential functions as soon as it is intended that optics enter the network. In this area not having available better components at more favorable prices will be a serious handicap, not only for the loss of value added, and therefore of jobs, but especially for mastery of systems;

I-C. Optical reading: indispensable to development of the telecopier, the visiophone, and videocommunications in general;

I-D. Printout and printer: indispensable for the telcopier and exchange office in general;

I-E. Display and visualization: indispensable to the development of a great many terminals and services of the exchange office and telemation;

II-A. Codec: essential because word signals are at present of decisive weight;

II-B. Image coding: indispensable for all live image services;

II-C. Addressed memories: indispensable for processing all kinds of signals, in terminals as well as in networks;

II-D. Filters: present everywhere in the network.

We thus arrive at establishing the table below about which we can make several comments:

/The expansion/ is still inadequate and it must be further expanded in order to see clearly. For example, A-2, (light emission) in practice covers technologies which are highly varied;

Some cases in the table having no crosses are nevertheless not without importance. For example, the cases of columns B-1 (Energy components), C-1 (Ceramics), C-2 (Insulators), and C-3 (Plastics) are empty despite their practical and economic importance; it is simply that today there is no reason for special concern over the progress to be expected in these areas in the near future.

With these reservations we may consider /technologies a priori/ those which correspond to the columns having numerous crosses or showing crosses at functions particularly strategic.

Technologies Functions	A-1 Optical support	A-2 Emission	A-3 Reception	A-4 Commutation and focusing, integrated optical addressing	A-5 Ultrarapid optics	A-6 Optical memories	A-7 Connectors, connections	B-1 Energy components	B-2 Microwave components	B-3 Memories	B-4 Analog integrated circuits	B-5 Digital integrated circuits	B-6 Microprocessors	C-1 Ceramics	C-2 Insulators	C-3 Plastics	D-1 Reproduction	D-2 Printing	E Logic technologies	F Human technologies
I-B Electrical-optical		X	X	X	X															
I-C Optical reading			X	X			X													
I-D Printout, printer	X	X		X													X	X		
I-E Display, visualization		X				X	X						X							
II-A Codec										X	X	X	X							
II-B Image coding										X									X	
II-C Addressable memories				X		X													X	
II-D Filters											X	X	X							

Naturally, the last table, derived from the very first by expansion of its first two columns into lines, is incomplete. Thus, for example, the lines II (Commutation), IV (Transmission), and V (Logic systems) being absent, we do not see the technologies concerned with telecommunications by satellite appear. Neither do we see appear other very important subjects such as technical administration or wideband commutation.

To be exhaustive it would be necessary, in accordance with the proposed methodology, to examine with adequate expansion all parts of the two basic matrixes:

--the services-functions matrix;
--the functions-technologies matrix.

Conclusion

Guiding an organization like the National Center for Telecommunications Research requires that the various activities of research and development which form its studies program be continually optimized, looking ahead in two distinct areas: the area of scientific and technical possibilities, on the one hand, and that of the strategic objectives of the General Directorate for Telecommunications on the other. These two areas interact and it is the constant interaction between the two orders of concerns which constitute the very life of a research center such as the CNET.

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OVERVIEW OF MILITARY'S COMMUNICATIONS CAPABILITY

Paris DEFENSE INTERARMEES in French Feb 81 pp 28-33

[Article: "Introduction of the Communications Branch"]

> [Text] The Communications Branch, which was established in 1942, is numerically the smallest of the various arms of the ground forces; it numbers no more than some 22,000 personnel, or about 7 percent of the total strength of the ground forces. The Communications Branch is one of the least known because of its small size and, above all, its discreet nature. The purpose of the following article is to raise, even though partially, the curtain on this branch whose technological development will, unquestionably, be the most substantial on the battlefield of tomorrow.

Missions

Generally speaking, the mission of communications is to maintain all the communications facilities needed by the command. This general mission, however, has several different facets: communications must be provided at all command levels, both horizontally and vertically; they must also cover vast areas on a permanent basis; they must insure the protection of their own communications systems from the efforts of the adversaries, electronic attempts in particular, while, inversely, trying to hinder or neutralize enemy electronic activities. Finally, the mission of communications is also to inform the command personnel and to help them in the decision-making process through informatics. The sum total of these missions, therefore, could be classified into three major areas of action entrusted to this branch, as follows:

Communications: Command liaisons on the levels of the forces and the infrastructure. The Communications Branch is in charge not only of operations in this area but also of the development of materials to be used;

Electronic Warfare: Defense of its own communications and interference with enemy communications. The branch is equally in charge of electronic warfare against the branch systems (jamming);

Informatics: The branch is in charge of operating all information facilities of the ground forces.

Finally, in all these areas the branch is in charge of communications security, both passive and active.

Organization and Structure

The Communications Branch, therefore, carries out its activities in a number of areas which may extend to other areas and frequently interpenetrate: the armed forces, the infrastructure, electronic warfare and ciphers, informatics and training. Currently it numbers 17 regiments or equivalent formations, 17 companies (or a total of 138 basic units) and 3 schools: in Montargis, Agen and Rennes. The branch is totally integrated within an interarm command so that it may carry out its own command and wage electronic warfare. Furthermore, it is the only branch whose activities in peacetime are identical to wartime activities; this makes the evaluation and adaptation of its ordnance and procedures far easier.

The Communications Branch is present at all interarm command levels. On the highest level, the Central Communications Office, under the command of the general staff of ground forces, takes part in studies related to the organization and use of the branch. Furthermore, it coordinates the development, operation and support of the fixed communications network and of data processing centers. It places orders with industry for the development of infrastructural materials and, for the ground forces, of information equipment.

On the level of each military district or large unit the branch is represented by a communications command and operational units deployed as force units and infrastructural formations.

Each formation is broken down into as many detachments as there are units or installations to be operated.

The automatic transmission facilities are concentrated in two centers on the national level, one of which is more particularly in charge of handling logistic information, and six regional centers whose ordnance is being renovated.

Communications units may be classified into two types:

Infrastructural units, for interarmy service, which provide support to all ground force units and installations. Such communications are provided both through the post telegraph and telephone cables (currently one-third of the total) and the RITTER system.

The force units, conversely, provide communications facilities to tactical units and the high command. A high command regiment is on the level of the government and the general staff; on the lower level a regiment has been assigned to the First Army; there are two or three regiments per army corps and a company per division. These units perform a more complex mission, for they provide all the necessary communications for combat units which, therefore, are mobile by definition and utilize a great variety of ordnance. Such communications use the RITA system for such missions.

Integrated Automated Transmissions Network (RITA)

This transmission system, whose study was undertaken in 1960 on the initiative of the DTAT [Ground Forces Communications Office], was designed to meet the telecommunications requirements of an army corps in terms of telephone and telegraph (wire or radio) facilities and the transmission of pictures or data. It must meet the double requirement of permanency and total reliability of communications and the possibility of linking up with the circuits of the various command posts wherever they may be located within the area of the army corps.

It represents the network which contracts or expands following the pattern of inter-arm maneuvers. It consists of nodal centers interlinked through hertzian beams. The stationary command posts are linked to these centers through hertzian beams while the mobile command posts use radio facilities.

The nodal center is the basic element of the system which makes linking and meshing possible. The center operates independently and has its own facilities for displacement, operations and safety. It can be made operational in two hours and dismantled in one. It has the following technical facilities: 8 hertzian beams, 1 automated digital exchange which automatically routes each communication and 1 radio linkage converter which allows 9 simultaneous radio communications.

The army corps command posts make it possible for the circuit to be linked with more than 100 users of all kinds. They have their own exchange and are connected through hertzian beams with two or three nodal centers. The divisional command posts have facilities for communicating with several dozen users of all kinds. They can operate only if they are connected with the nodal centers through hertzian beams. Radio linkage (tactical command posts, mobile units, etc) allow a single user or a user in motion within the area of the army corps to use the same telephone and telegraph facilities as the users of a stationary command post.

Operation

The RITA is a meshed circuit, entirely digital, in which the necessary routing of each transmission is achieved through a technique known as "call diffusion." This makes it possible to remain operational despite heavy destruction. Each junction, being part of the mesh or the linkage, is automatically and electronically coded. Every user is identified by a code number which he retains whatever his geographic position may be within the area of the army corps. The command and control of the operation of the RITA circuit are provided by the CECORE information system.

Let us note that the RITA could be linked without difficulty or delay to another RITA neighboring system (army or other army corps), the infrastructural grids (post telegraphs and telephones and RITTER) or grids of allied forces (Belgian).

The Program

Following the initial studies, developments and practical experimentation of the principles, the RITA was developed as follows:

1972: development of a complete experimental circuit; application and experimentation within a unit;

1976: industrial production contracts;

1978: completion of experimentation;

1979: series production of the initial materials;

1982: use by the French and Belgian ground forces.

Let us note that there has been a one-year delay in the installation of the system which is currently scheduled for the end of 1982-beginning of 1983.

The Integrated Ground Transmissions Circuit (RITTER)

The updating and restructuring of the infrastructural telecommunications network were undertaken in 1969 with a view to providing the ground forces with a flexible and reliable system which would operate independently of the civilian postal telegraph and telephone circuits. The RITTER was conceived for the purpose of enabling the command institutions of the ground forces or, if necessary, the interarmy or governmental services, to have at their disposal instantly and under all circumstances reliable communications with subordinate levels.

Its characteristics are the following:

it covers the national territory and can be quickly linked with the forces' circuits (RITA);

possible interconnection with the air and navy circuits;

meshing which insures redundancy;

advanced automation.

The basic circuit serves seven main centers corresponding to the military districts, on the basis of a central quadrangle (4 emissions centers). Communications are provided through tropospheric or straight-line hertzian beams. The purpose of the current extension is to connect with the existing network all military divisions and main garrison cities.

The RITTER facilities consist of 73 communications centers, 80 hertzian terminals (from 12 to 72 channels), with 11 automatic telegraph relay centers and 11 semi-automatic electronic centers at the mesh junctions, 200,000 km of permanent circuits, 620 telephone booths and 70,000 telephone sets. In the future, in 1982 probably, the linkage points for moving or engaged forces (including the French Forces in Germany) will be increased. Automation will be expanded through the use of digital techniques at the completion of a data transmission network. However, the facilities of the post telegraphs and telephones will always be used as additional or replacement facilities in case of need. Let us note that nothing comparable to the RITTER existed before 1970.

Communications Today

The Communications Branch totals 26,200 men as follows: 1,600 officers, 8,000 non-commissioned officers, 15,000 servicemen and 1,600 civilians; 13,500 are with the branch units and 11,500 are with the infrastructure.

The branch units total 11 regiments (1 RT [Communications Regiment] of the high command, 1 RT assigned to the First Army, 3 RT to the First Army Corps, 3 RT to the Second Army Corps, 2 RT to the Third Army Corps, the 44th RT which is an electronic warfare regiment, based in Landau (FFA), and 15 companies, 14 of which are divisional and 1 electronic warfare company).

The infrastructure and information units total 3 RT, 5 operational groups and 8 data processing centers.

Development in the Decade of the 1980s

Unlike the other branches whose ordnance is becoming ever more complex and more and more expensive and, therefore, less and less numerous, in the course of this decade communications will benefit from the factual technological revolution of the generalized use of information facilities and digital technologies and, above all, the creation of the microprocessor.

In effect, this development will change not only the "communications" function by increasing the possibilities and the potential of the branch but will also enable it to revolutionize the exercise of command by providing, in real time, the sum total of data needed for decision making, information which, in the past, had to be patiently assembled manually. Thus, a small number of transmitters would be able to gather instantly or almost instantly battlefield data, insure their processing and development through informatic facilities and, finally, their transmission or relay.

Therefore, it is no exaggeration to speak of a "revolution" which will affect all communications facilities and which will have major repercussions on formation structures, the utilization of facilities and personnel formations.

Starting with 1982 the Communications Branch will be backed by the RITA which will provide opportunities incomparable in terms of the currently used systems. Let us note that any user of the circuit, whatever his place, even in motion, will be contacted through automatic scanning.

Starting with 1983 the same techniques will make it possible to increase considerably the possibilities of the fixed infrastructural military network--the RITTER--which will cover the entire national territory with a mesh of high performance relays and will soon be supplied with instant electronic switchboards.

In the informatics area the expected developments will be equally substantial, particularly with the development of a data communications network which will interlink military districts and divisions.

The transmissions branch will be inexorably affected by progress dynamics in this advanced sector which will experience the fastest and most extensive development in the course of the forthcoming decade.

Control of Electromagnetic "Space"

The armed forces are making ever greater use of electromagnetic waves in the transmission of information, detection and definition of targets, the guidance of vectors for projectiles, guidance in movements, surveillance, and even sighting....

There no longer exist transmission, command, or weaponry systems which do not use the emission and reception of electromagnetic radiation.

Quite naturally, the conquest of electromagnetic space has become one of the targets in modern interarms combat: this conquest must be accomplished for the sake of expanding one's freedom of action in maneuverability and narrowing that of the enemy. Gaining this superiority is as important as superiority in the air which must be attained at all costs.

This mastery may be acquired, or lost, through electronic warfare which, therefore, must be considered one of the essential components of maneuverability.

Electronic warfare (GE) whose field of action is steadily expanding, is assuming two permanent aspects:

the "attack" aspect: seizing the initiative and engaging in offensive GE actions;

the "defense" aspect: protecting oneself from "adverse electronic" activities.

The "Attack" Aspect of Electronic Warfare

This is the work of units specialized in electronic warfare. It is the most dynamic and the most integral aspect of maneuverability.

Here again we must distinguish between two major types of activity:

Electronic Scanning Activities:

This means making the best possible use of the opponent's emissions by:

intercepting them;

analyzing them (content and container);

localizing the corresponding transmitters.

In such a case electronic warfare is part of the surveillance and intelligence system: its functions of analyzing and locating make it possible to identify weaponry systems, command posts and units, and to reconstitute the "electronic" battle order and the picture of the overall battle order.

Without even attempting to decode the content of the messages, the electromagnetic activities of the opponent provide information on its overall activities, attitude and intention, particularly if we correlate such indicators with data obtained through other intelligence sources.

Electronic Countermeasures: These are emissions which hinder the opponent in order to neutralize his weaponry systems or command networks and misguide him.

This includes electromagnetic jamming, intrusion and deception.

Such actions can be only specific in terms of time and space, unlike electronic scanning activities which must be permanent. They are more delicate to accomplish and are subject to a variety of restraints. In particular, all of them require a good knowledge of the characteristics of enemy emissions and good coordination.

Attack Means

The units carrying out such "attack" missions are organized on the basis of their targets and the range of frequencies to be dealt with, as follows:

units specializing in attacking transmission systems;

units specializing in attacking weaponry systems (radar).

The units which attack transmission systems may be adapted to cover either the high frequency or the very high frequency range.

All of them include the following:

intercept and monitoring stations (radio and hertzian beams);

location stations (a mobile radiogoniometric network with a directing station);

jamming stations;

interpretation crews.

All of them have their own means of communications.

In peacetime they operate within an electronic warfare regiment under the Second Army Corps (44th RT).

The "Defense" Aspect

This system offers protection from enemy electronic attacks. Electronic protection measures are a general concern, as follows:

they are the concern of the designers of special systems (such as "anti-jamming" or anti-interception), of cryptophonic and cryptotelegraphic materials, etc;

they are the concern of the command which must define the rules governing the special use of such materials (such as, for example, radio silence);

they are the concern of all users who must observe security rules in the use of such materials.

In conclusion, let us emphasize two simple yet basic ideas:

1. Electronic warfare is not a "separate world:" both in terms of intelligence and support it supplies the command with additional means, frequently complementary, which must always be used with concern for correlation, coordination, combination and mutual aid: the targets detected through electronic scanning must be neutralized through firepower or jamming.

II. Electronic warfare cannot tolerate surprise, for reaction delays in this area, more than anywhere else, may be considered inadmissible in terms of maneuvering requirements. That is why electronic scanning must be permanent. Furthermore, eletronic protection measures must be taken at all times, particularly in peacetime, if the "electronic research" of an eventual adversary is to be kept fruitless.

The Ground Forces' Higher School of Electronics

The ESEAT [Ground Forces Higher School of Electronics], which has operated in Rennes since 1973 and which includes the experimental electronic warfare company, has the following basic missions:

to provide the cadres of ground forces with general knowledge of electronics, completed with practical training;

to provide the practical training of the personnel of the communications and the other branches and arms who are mastering technical specialties in the "electronic-telecommunications-informatics" branch;

to provide the training of interarmy cadres in general and specific information techniques.

The ESEAT has the following facilities for the implementation of its mission:

19 practical classrooms (1,500 different machines);

a MITRA 121 computer;

a MITRA 15 computer;

a heavy B 700 terminal linked to a B4 800 computer (to be replaced by a MINI 6 CII-BH in 1980)

a CO 500 computer with 6 image screens;

2 automatic communication switchboards;

equipment for the forces and the infrastructure (RITTER, RITA, radio, hertzian beams, telephones and telegraphs);

an audio-visual section and a duplication workshop. Every year the ESEAT accepts about 1,000 trainees for 60 training courses.

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FRANCE

MODERNIZATION OF INTERURBAN COMMUNICATIONS NETWORK DISCUSSED

Paris ELECTRONIQUE ACTUALITES in French 23 Jan 81 pp 1, 6

[Article by D. Levy: "National Communications Agency Emphasizes Microwave Links and Prepares for Introduction of Optical Fibers"]

[Text] Just like switching, transmission is experiencing a fast speed in numerical control. According to Mr Fortin, director, DTRN (National Network Telecommunications), the numbering of the interurban network will be completed around 1992. This tendency is accompanied by the rapid installation of high-capacity and long-distance numerical transmission systems featuring control of the first three hertzian links at 140 Mbits/sec, by the end of 1980, the development of a system with 560 Mbits/sec, using coaxial cables, for which the first operational artery will be ordered this year, and the large-scale introduction of optical fibers with big orders probably starting in 1982. The change in the interurban network will be such that, as of that date, the DTRN seriously contemplates ordering only hertzian beams [microwave links] and optical fibers (which will thus replace the coaxial pairs).

The general use of numerical transmission has persuaded the DTRN last year to terminate its orders for analog equipment in order resolutely to turn toward new numerical techniques used in connection with microwave links and coaxial cables while studying the possibilities of introducing optical fibers.

In the cable field, DTRN thus last year placed in service the first links with 140 Mbits/sec which are now the subject of series orders from SAT, CIT-Alcatel, and LTT. DTRN by the end of this year will furthermore order the first operational link with 560 Mbits/sec which will be placed in service during the first quarter of 1983 between Paris and Reims; its prototype was made by CIT-Alcatel/SAT; it will be tested in 1982 between Bordeaux and Bazas. This system (7,680 channels) appears, for the next several years, in the form of numerical transposition of 60 MHz.

Right now however the DTRN is planning to stop orders for coaxial cables starting in 1982 in order thoroughly to go into optical fibers "which will be our TGV," emphasized Mr Fortin on 14 January while receiving the Association of Telecommunications journalists at the Chennevieres radio link tower near Paris. Ending the completion of the first series-production contracts and especially the Paris--Lyon link, which will probably be the first big cable consisting of optical fibers ordered, in 1984 perhaps (the strip of land required for the installation has already been purchased), CTRN will evaluate experimental links, such as the hertzian retransmission facility at Dijon (CLTO) and Le Mans--La Fleche--Angers (notice going out to Cables de Lyon for the first portion and to LTT for the second portion).

Work With Microwave Links

In the hertzian field, DTRN will also start a big numerical control program. The policy adopted consists first of all in equipping the (available) 11 GHz band; the first orders for microwave links at 140 Mbits/sec were awarded at the end of last year to Thomson-CSF/SAT for the Paris--Rouen, Paris--Reims, and Paris--Caen links (commissioning expected at end 1982, start 1983). DTRN will then embark upon a replacement program by installing numerical controls for the 6.5-GHz band (the 2,700 analog channels will be replaced with 140 Mbits/sec) and the 6-GHz band (the 1,800 analog channels will be replaced by 140 Mbits/sec or 2 x 34 Mbits/sec, but technical problems, connected to the narrowness of the frequency band may come up).

The first orders for 6.5 and possibly 6 GHz will be awarded in 1982-1983. "Thus," anticipates Mr Fortin, "the interurban network will be entirely under numerical control in 1990, 1992, or 1995, depending upon whether the program comes along faster or not so fast."

From this viewpoint and in spite of the support which they will get in the next several years, the portion involving microwave links will level off at 50 percent of the transmission supports [subsidies]. This part, we might note, has been growing constantly over the last several years since it rose from 11 percent in 1969 to 27 percent in 1973 and 47 percent in 1980 (as against 53 percent for systems using cables).

DTRN is getting microwave links from three manufacturers, to the extent of about 50 percent through Thomson-CSF, 30 percent for SAT, and 20 percent for TRT. These three companies supply most of the numerical microwave links with 2 Mbits/sec, 8 Mbits/sec, 34 Mbits/sec, 2 x 34 Mbits/sec, and 140 Mbits/sec.

We might finally add that the DTRN this year will continue its policy for the equipment of temporary transit [routing] centers ("E-12" and "MT-20"), which it is pursuing in order to develop (through CIT-Alcatel associated with other manufacturers) a prototype for the automatic switching system with 2,700 channels using cables and microwave links (on the Paris--Lille-Reims link); it is also thinking of installing a specialized free-call change-over switch [commutator] in the Chennevieres radio link tower.

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OTE IMPROVES COMMUNICATIONS WITH SHIPS

Athens AKROPOLIS in Greek 1 Feb 81 p 10

[Text] Since the year 1949, the State has entrusted the OTE [Greek Telecommunications Organization] with the responsibility of operating the shore radio stations to insure communications with ships. Within the framework of this jurisdiction, the OTE is, at all times, as much concerned with the development of the necessary facilities as with their continuing improvement. With these facilities, it is sought to improve, as much as possible, the communications service with ships at sea located within a short, half-way, or far-away range and, more specifically:

A. Serving the Greek Maritime Space

The OTE has created a special network of 20 very-low frequency stations (150-174 MHZ) which have been located at specially selected spots in the Country. Every one of these stations, except the safety (SOS) and call channel, operates 2 or 3 working channels for a more complete traffic service.

This network, which began operating in 1972, is the most complete in the Mediterranean area. It covers practically the entire Greek maritime space in addition to a great portion of the Lybian Sea, the Eastern Mediterranean, the Dardanelles, and the Adriatic Sea.

The above mentioned network can provide service not only to merchant vessels, which have at their disposal experienced operators, but also to any other small vessel such as pleasure craft. In view of this, it is especially important because, in addition to the fine service it provides to ships sailing in Greek waters, it contributes substantially to the development of tourism in the Nation.

The importance of the very-low frequency network is evidenced by the traffic which was handled by it. In 1972, when it began its operations, it handled approximately 2,000 messages with ships. Since then this traffic has steadily increased, reaching 280,000 messages in 1979.

B. Service to Intermediate Range Communications

This term defines the maritime area comprising the Adriatic Sea, the Central

and Eastern Mediterranean, the Dardanelles and a sector of the Black Sea; in other words it overlaps the Greek maritime space and extends far beyond it.
In order to provide service for the above mentioned area, the OTE has designed and completed the greater part of a network of four up-to-date shore stations in the following key locations of the Country:

a. In Kerkyra

b. In Crete

c. In Limnos

c. In Athens

This network, which operates according to the international regulations of radio communications, is equipped with an entirely modern system and provides service to the ships by radiotelegraphy on a medium frequency (405-525 KHZ) and by radiotelephone on a medium-low frequency (1,6-4 MHZ).
This network provides service mainly to merchant ships sailing in the above maritime areas and which, according to the International Safety Agreement (SOLAS), must have available equipment that can operate on medium and medium-low frequencies. 90,000 ship-to-shore conversations and 75,000 telegrams were handled in 1979 within this network.

C. Service to Long Range Communications

To serve ocean-going vessels, the shore station (complex) of Athens operates on short wave length (4-28 MHZ) and is composed of the Receiving Center of Loutsa, the Transmitting Centers of Pallini and Spata. It provides service to ships by radiotelegraph, radiotelephone and radioteletype by short wave (4-28 MHZ).
Because of its equipment, transmitter-receiver, antenna, etc., the facility of the Athens shore complex is rated as one of the largest shore stations among the principal maritime countries of Europe.
From this short wave facility service is provided for communication with vessels within short and very long distances. Thus, in 1979 approximately one million telegrams and 400,000 conversations were handled.
It should be emphasized that, in addition to the communications, all special messages to ships (announcements to seamen, soccer pool bulletins, medical advice, etc.) are handled by the network of the OTE shore stations.

D. Forecast for the Future

The efforts of the OTE for off-shore communications do not end with the above accomplishments,
Thus, it continues its activity within the framework of the possibilities allowed by the general situation of the nation, to wit:

a. Building of a new, up to-date short wave facility

In order to provide better communications with ocean-going ships, the OTE has scheduled the construction, by 1985, of a new short wave shore station in Western Peloponnisos at a budgeted cost of one billion drachmai (1980 value).
This new station will be made up of the receiving center "ARETI", the transmitting center "EPITALIO" and will further improve the communications with ocean-going ships.

b. Participation in the International Maritime Satellite System "INMARSAT"

Greece is included among the founding members of this system (INMARSAT) and contributes a high percentage of stocholding capital which assures her a permanent participation on the Board of Directors.
In addition, she participates systematically in all advisory committees for the development of the Space Division.
Simultaneously the construction of the necessary ground stations in our country is being prepared at a suitable time.
The above system is intended to provide automatic service similar to that supplied by the ground networks and which is not available from the rest of the facilities of the Agreement. This service is particularly necessary for the up-to-date functioning of the maritime operations for the speedy and effective control of ships(tankers, cruise ships etc.). The OTE will spend 700,000 drachmai (1980 value) for the construction of the facility of maritime satellites and the corresponding ground stations.
The shore facilities are served today by approximately 500 specialized personnel who consciencioualy labor to provide the best possible service to the ships.
From the above it is easy to obtain a picture of the continuous efforts and the activities of the OTE in the sector of shore communications for the best possible service to ships and seafarers.

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GREECE

DIRECTION FINDERS TO DETECT ILLEGAL RADIO STATIONS

Athens TO VIMA in Greek 7 Feb 81 p 7

[Article by N. Khasopopoulos: "An End to the Radio Pirates' Immunity"]

[Text] It appears that the countdown for radio pirates, and probably for telephone pirates, has begun. In recent months the wrongdoing has gone too far, so much, indeed, that it has very seriously concerned authorities. More and more radio pirates are appearing daily on the short and medium waves; they are intruding on government radio stations and telephones and they are transmitting music and commercials for building lots and night-clubs!

It is not enough that the pirates are broadcasting on their own stations at all hours of the day and night, but they are intruding also on government radio stations (particularly YENED [Armed Forces Information Service]), provoking parasites. Their continually increasing activity has resulted in disturbance and confusion on telecommunications and problems on communications via airplanes and ships.

The government has decided, after repeated conferences, to begin a great campaign to locate piratical radio stations which broadcast not only on medium waves, but also on FM. As has become known, it has already been decided that there be procurements from abroad of radio direction finders specially made to detect the illegal radio frequencies which are broadcast by short waves. Up to now, the direction finders used by the Ministry of Communications' Radio Frequencies Control Directorate were specifically for locating radio pirates broadcasting only on medium waves. It seems that the radio pirates everywhere knew this, so they changed frequency and now broadcast their programs of every kind on short waves.

The new direction finders are going to be installed on two of the Ministry of Communications' mobile crews which will patrol all the Athens' neighborhoods. They will be able to pinpoint with accuracy anything broadcast on short waves up to 400 megacycles. As soon as the radio pirate is located, the police will be called to arrest him and drive him to court. The crews, with the amplified direction finders, will also move in other Greek cities to detect radio pirates. Finally, they will also be able to locate the pirates who intrude on the telephone network and transmit from telephones various commercials and songs. As is known, several months ago a radio pirate managed to get on the telephone network and "block" with music telephones on Kypselis and Patision.

But the strange thing in this peculiar affair with the radio pirates, who for years now have acted uncontrolled and undisturbed, is that they are rarely arrested although many times in their broadcasts they transmit their telephone numbers or the telephone numbers and addresses of their advertised "customers." Of the many asked, no service gave a specific answer as to why these radio pirates remain unarrested. The only answer we received is that it is difficult to locate them because they broadcast on short waves.

Although--as it appears--things are beginning to now get difficult for the radio pirates with the procurement of amplified direction finders, nothing positive has happened as concerns locating television pirates. Television pirates made their first appearance several months ago projecting cigarette packs on our televisions. They later also projected a porno film and upset everyone. Two ministries had been mobilized at that time to locate them, but without any result. After this, the television pirates stopped for awhile. Then last week, exploiting a YENED breakdown, they projected for about an hour an Italian film ("The Great Traffic Jam") which quite a few Athenians happened to see.

There is no machine (at least in Greece) which is able to locate the broadcasts projected from television channels. The machines with which the services are equipped can only locate the area from which the illegal film is projected. Beyond that, nothing. The direction finders are completely useless because in order for the television pirate to be located, he must broadcast sound. Usually, however, the television pirates, when they have appeared, have remained silent. They have always transmitted pictures....

"Paranomos" Was Silent

The illegal radio station called "Paranomos" today stopped making dedications to the youths of Ptolemais after the arrest of its owner, a sixteen-year-old student. However, the campaign by organs of the Ptolemais Gendarmery produced other arrests, of Stelios Panagiotidis, 20, Dimitrios Khatzopoulos, 19, and a seventeen-year-old. All the machines were seized.

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March 18, 1981